Stage II Vapor Recovery

Wisconsin Department of Natural Resources
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Stage II Vapor Recovery in Wisconsin

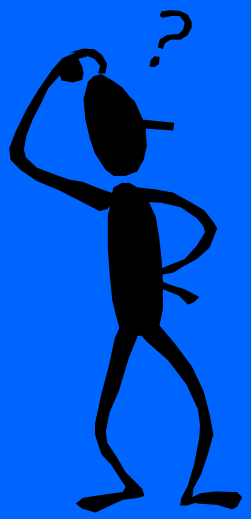
www.sos.state.il.us/library/isl/ref/glo/wisconsin.html

Presentation Outline:

- Introduction
- Compliance Areas in Wisconsin
- Brief explanation of Stage I Vapor Recovery
- Brief explanation of Stage II Vapor Recovery
- How do we know if Stage II works?
- What you can do if there is a problem?

Introduction

This presentation will inform the public on the issues related to Stage II Vapor Recovery in Wisconsin. We hope that after viewing this presentation, your questions pertaining to the Stage II System, such as the ones below, will be answered:



What is Stage II Vapor Recovery?

Where is Stage II required in Wisconsin?

Why is Stage II required in Wisconsin?

Who can be contacted?

The Clean Air Act Amendments of 1990 classified southeastern Wisconsin as a severe ozone non-attainment area. This means that southeastern Wisconsin's air quality is not meeting the federal standard set to protect public health. To improve air quality, Stage I and Stage II Vapor Recovery were put into action to capture harmful vapors, known as mobile source air pollutants, from escaping into the air we breathe.

www.nationalatlas.gov/ federal.html

Introduction

www.oneworld.net/penguin/pollution/ pollution_home.html

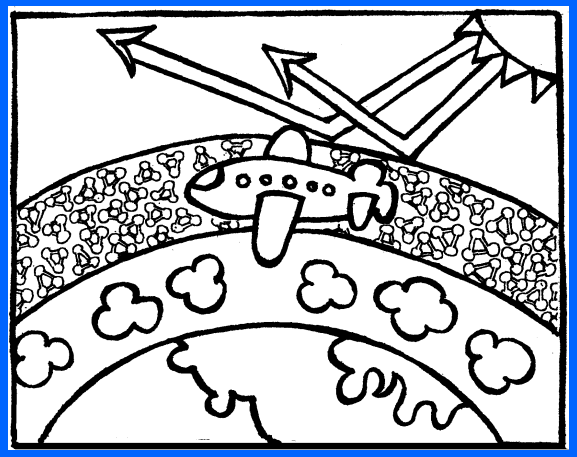
Many chemicals in gasoline vapor can lead to poor air quality. These vapors then contribute to the formation of ground level ozone-- the main ingredient of smog-- which can cause a number of respiratory problems. The elderly, active children and adults, and people with respiratory disease--such as asthma--find it more difficult to breathe when ground level ozone levels are high.

What is Ozone?

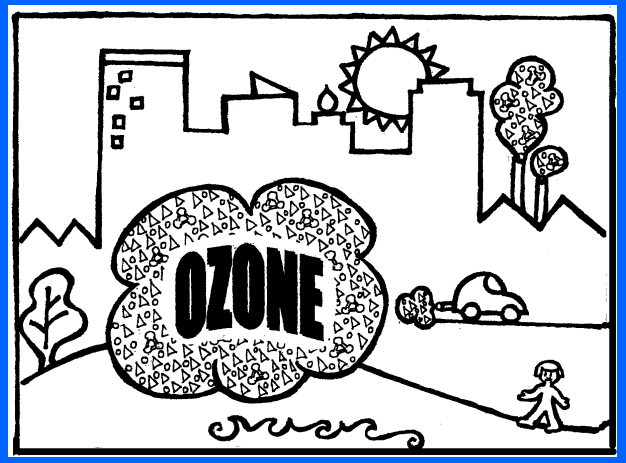
Ozone is a gas that occurs both in the Earth's upper atmosphere and at ground level. Ozone can be good or bad, depending on where it is found.

Good Ozone. Ozone occurs naturally in the Earth's upper atmosphere--10 to 30 miles above the Earth's surface--where it shields us from the sun's harmful ultraviolet rays.

Bad Ozone. In the Earth's lower atmosphere--our breathing space--ozone is created by air pollutants and can cause a number of respiratory effects.



Ozone is good up high,...



but bad nearby.

Pollutants emitted by vehicles, power plants, chemical plants, and other sources, such as dry cleaners, react chemically in the presence of sunlight and form ground level ozone.

www.pbs.org/newshour/extra/features/ july-dec01/g-8.html

http://www.epa.gov/airnow/health/smog1.html#1

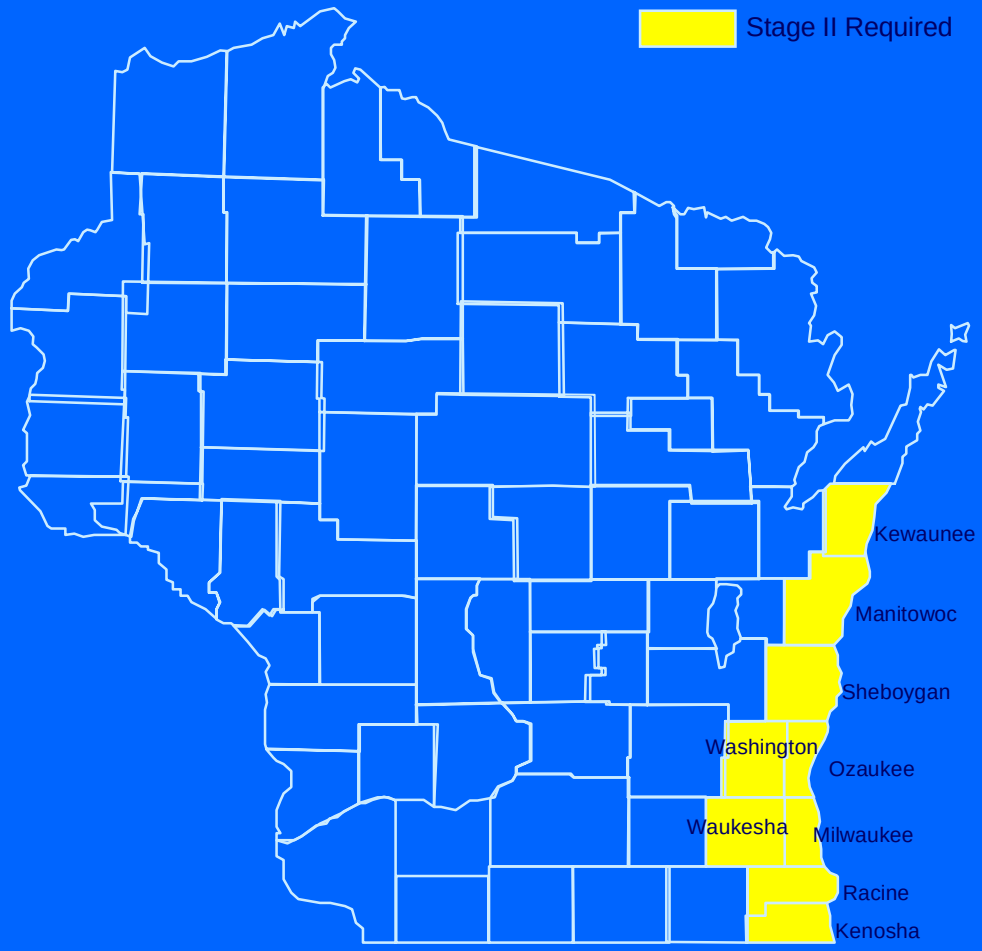
www.kingkullen.com/ services2.asp

Stage II Vapor Recovery is just one of the programs in Wisconsin designed to improve air quality.

Compliance Areas

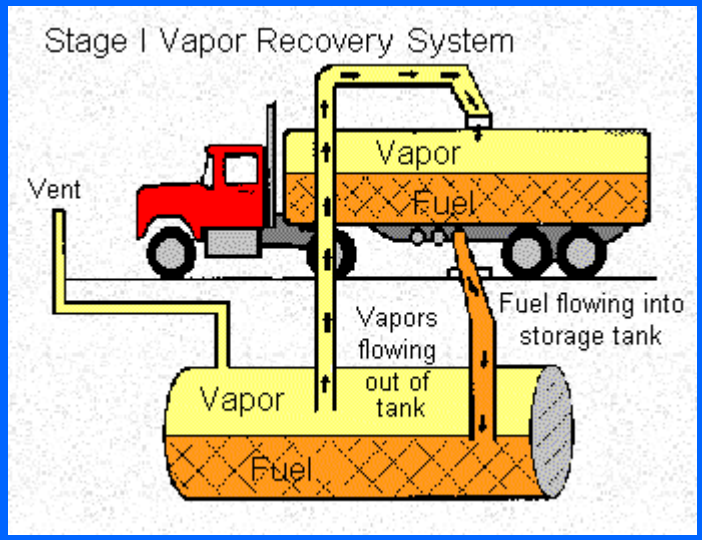
Stage II Vapor Recovery is required only in the following nine Wisconsin counties: Kenosha, Kewaunee, Manitowoc, Milwaukee, Ozaukee, Racine, Sheboygan, Washington, and Waukesha.

Within these counties, all stations that pump over 10,000 gallons of gasoline per month are required to install a Stage II Vapor Recovery System at their station.



Stage I Vapor Recovery

To understand Stage II Vapor Recovery, you must know a little something about Stage I. Stage I Vapor Recovery is still present today at all gas stations with Stage II Systems installed. The addition of Stage II only aids in the vapor recovery process, it does not hinder Stage I. Stage I is the process of capturing gasoline vapors formed in the underground storage tanks before they are let out into the atmosphere. These vapors do not come from the refueling vehicles, but are formed in the storage tanks themselves. Stage I recovery takes place only during underground storage tank refueling.

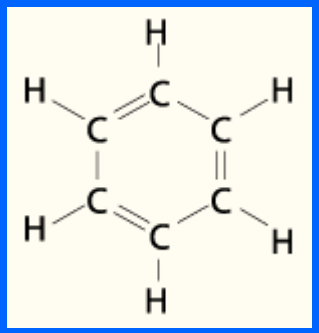


www.apcd.org/fueling/

Brief Explanation of Stage II

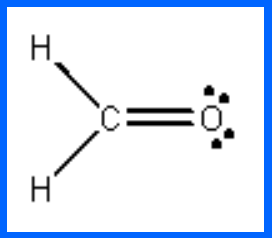
Stage II Vapor Recovery in Wisconsin is designed to capture 95% of gasoline vapors during vehicle refueling. This is something that Stage I Vapor Recovery could not do, and is important because gasoline vapors contain harmful chemicals known as VOCs (volatile organic compounds). Among the many VOCs in gasoline are benzene and formaldehyde, both of which are believed to cause cancer in humans.

Benzene: C6H6



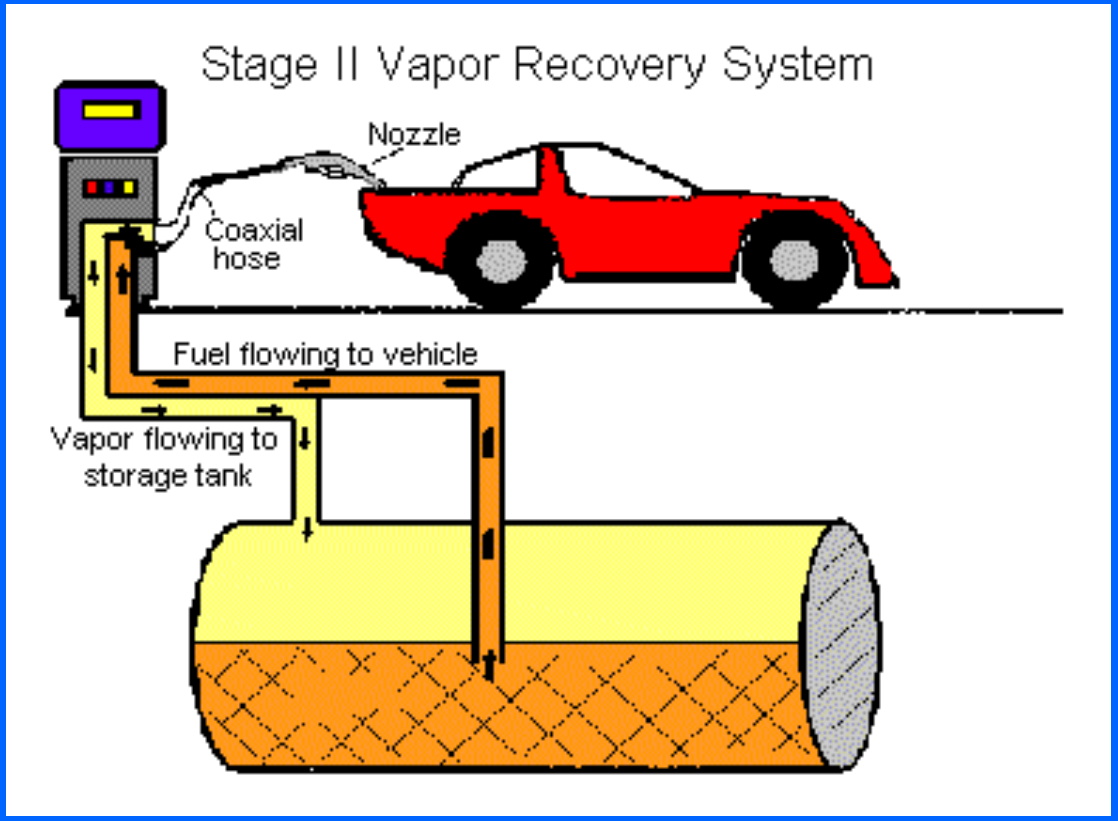
http://www.wikipedia.com/wiki/benzene

Formaldehyde: CH2O



www.chem.orst.edu/ch331-7t/CH331F00/keys/quiz1key.htm

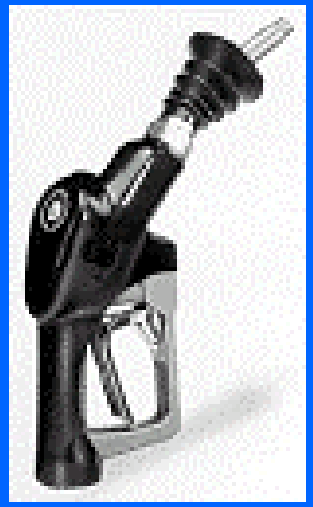
The general function of Stage II Vapor Recovery is to draw the vapors produced during the refueling process back to the underground storage tank. Stage II systems use special equipment to capture vapors before they enter the atmosphere. The following slides will explain some of this equipment.



www.apcd.org/fueling/

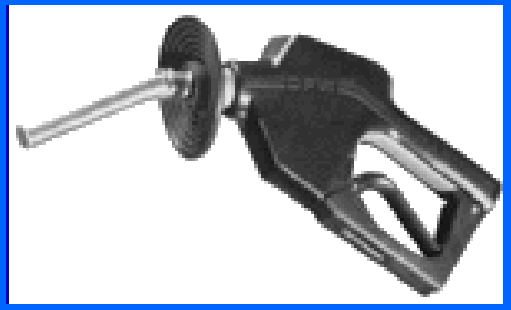
Nozzle Types

Vapor recovery nozzles are specially designed to recover vapors while vehicles are refueling. One way to detect these nozzles is by looking for 5-20 holes encircling the barrel of the spout. Also, all certified nozzles have an automatic shut-off valve that can be detected by looking for one lone hole near the tip of the nozzle.



http://www.husky.com/v34convac.htm

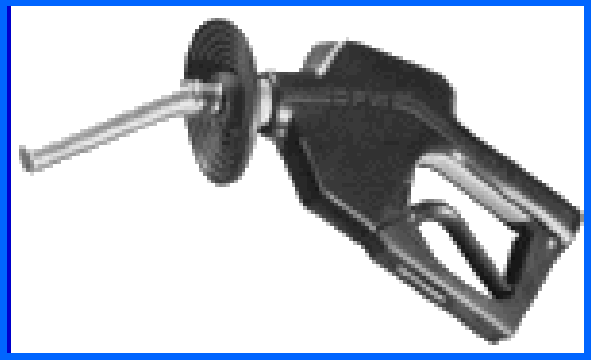
There are two different types of nozzles that are certified to be used with vapor recovery systems. These are **booted** and **non-booted** type nozzles.



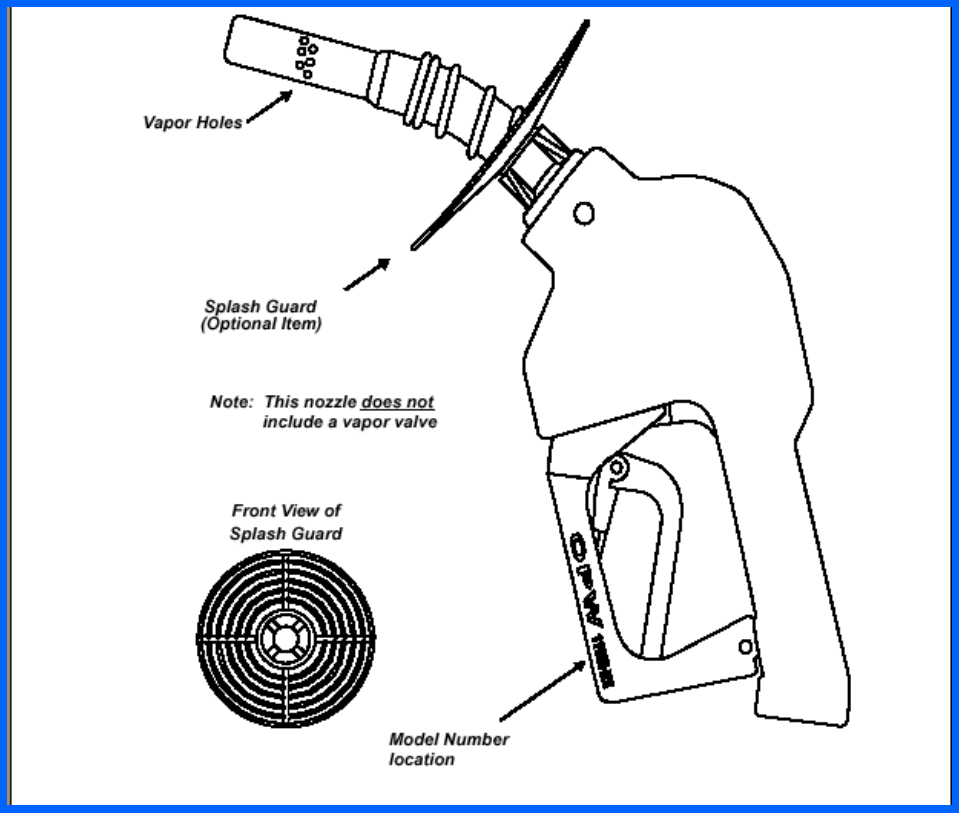
www.oilequipment.com/_catalog/nozzles.html

Non-Booted Nozzle (Splash Guard optional)

A non-booted nozzle installed with a splash guard is designed strictly to protect the person dispensing the fuel in case the automatic shut-off mechanism does not work properly.



www.oilequipment.com/_catalog/nozzles.html

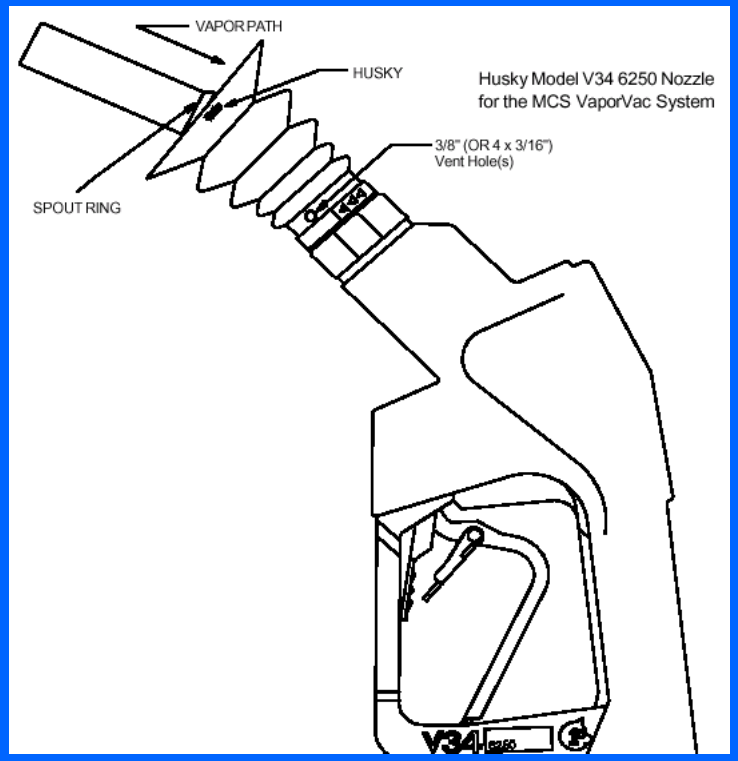


http://www.arb.ca.gov/vapor/eos/eo-150ae/150ae-f1a3.pdf

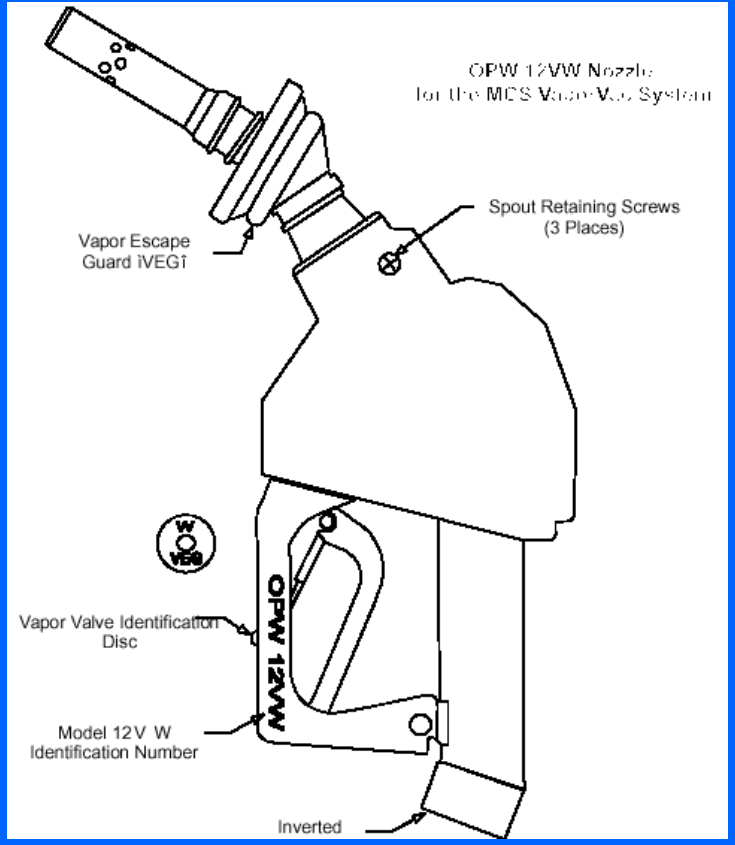
Booted Nozzles

Booted nozzles are designed to assist in vapor recovery by keeping vapors in a confined area until the vacuum in the gasoline pump is able to draw them into the vapor return line.

http://www.husky.com/v34conv ac.htm



CARB Executive Order: G-70-150-AE Exhibit 1 Figure 1B-3

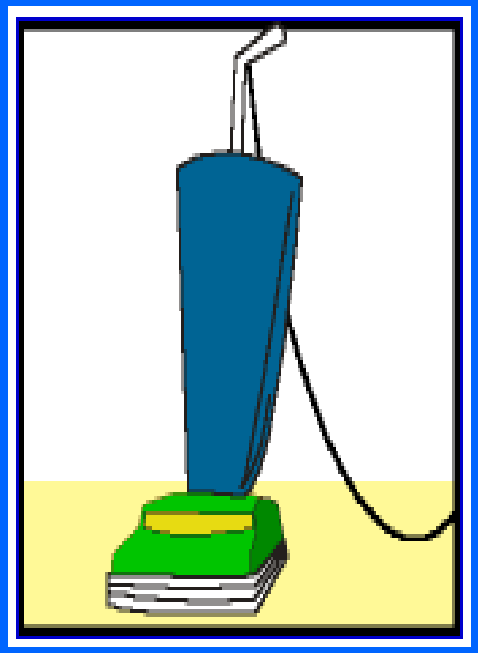


CARB Executive Order: G-170-150-AE Exhibit 1 Figure 1B-4

Both types of nozzles are certified to be used with vapor recovery systems. The non-booted nozzle can comply with state regulations even if the splash guard is not attached. Therefore, lack of a splash guard or a boot does not automatically mean the system is out of compliance. Most of these cases are non-booted nozzles that have lost their splash guard.

The **non-booted** splash guard nozzle is used on systems in which the vacuum is set at a higher level, and thus a boot is not necessary.

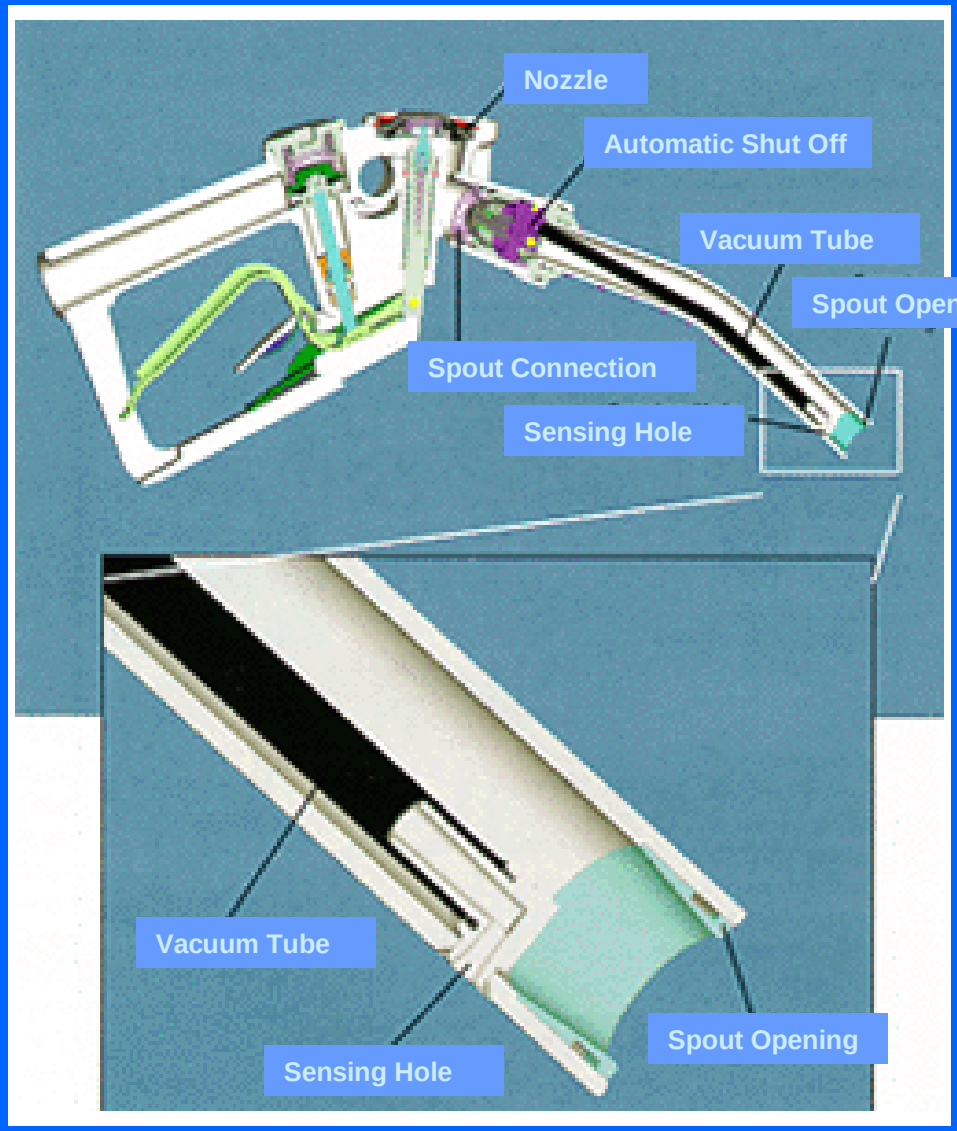
The **booted** nozzle is used on systems in which the vacuum is set at a lower level, and thus requires the vapors to be contained while the vacuum draws them into the system.



www.epa.gov/superfund/kids/_sup_fact/mercury3.htm

Automatic Shut-Off

The automatic shut-off mechanism is designed to quit pumping before you overfill your gas tank. A sensing hole, built into the spout of the nozzle, allows gasoline dispensing to occur when air can flow freely through the hole. When gasoline covers this hole -- near the point of overfilling your tank -- air cannot pass through and gasoline dispensing ceases.



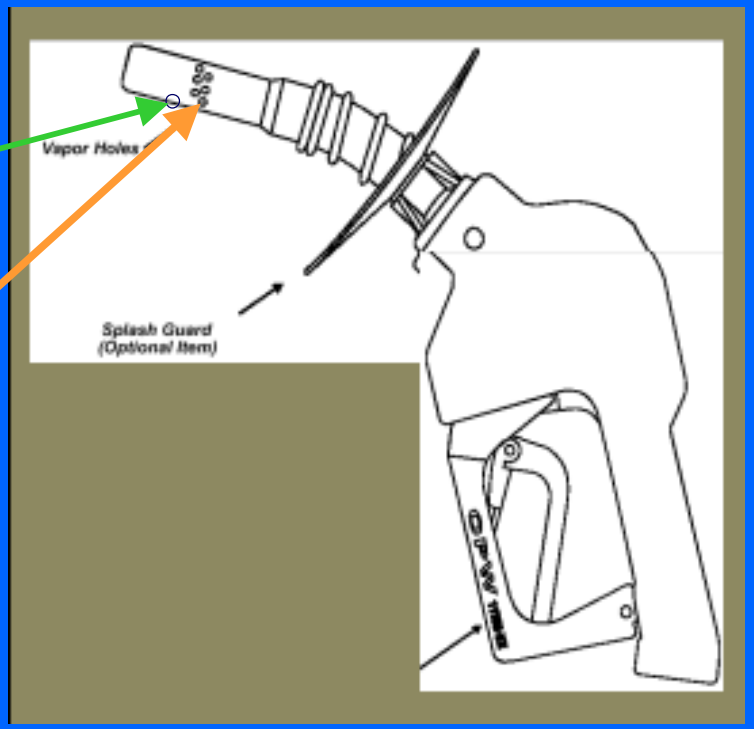
www.husky.com/asptip2.gif

Slightly higher on the nozzle, a large number of vapor recovery holes encircle the barrel of the nozzle to collect gasoline vapors generated by refueling. By the time the automatic shut-off mechanism terminates dispensing, gasoline has already entered the vapor recovery holes. The vapor recovery holes connect to the vapor return line, which leads back to the facility's underground storage tanks.

Sensing hole

(approximate location)

Vapor recovery holes



http://www.arb.ca.gov/vapor/eos/eo-150ae/150ae-f1a3.pdf

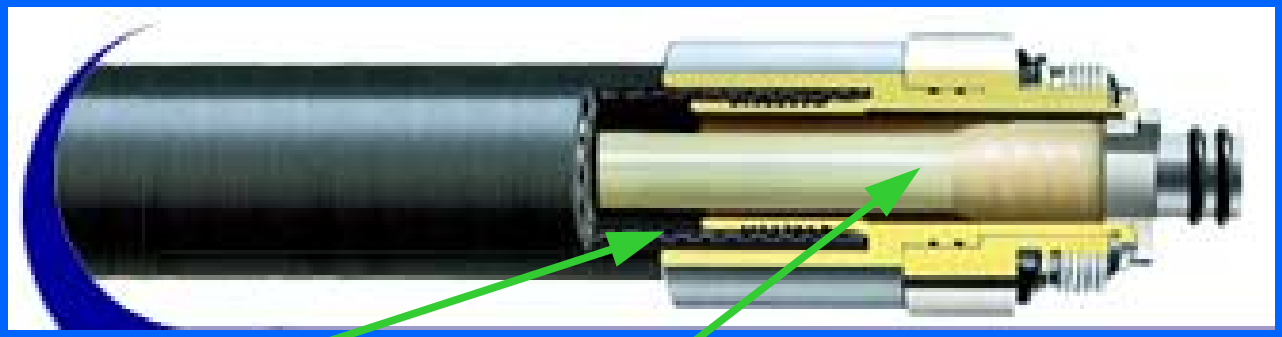
Topping Off

Do not top off! You are topping off if you continue feathering the trigger on the nozzle after the automatic shut-off has ceased dispensing.

www.co.mo.md.us/services/_dep/Factsheets/home.html

If the automatic shut-off has terminated dispensing, gasoline is already covering the automatic shut-off mechanism's sensing hole and the vapor recovery holes. If you continue to feather gasoline into your tank, theoretically you are drawing gasoline into the vapor return line and **NOT** putting the fuel in your vehicle's tank. Plus, topping off increases the chances for a spill to occur.

Coaxial Hoses



http://www.goodyearindustrialproducts.com/industrialhose/pdisp/fixstva.html

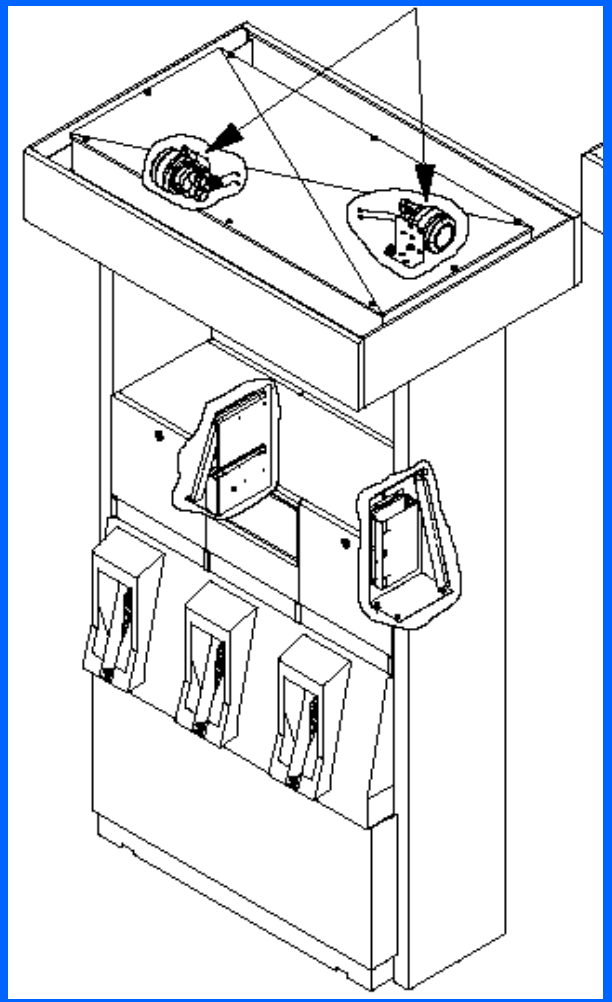
Gasoline Dispensing Tube

Vapor Return Tube

Stage II Vapor Recovery systems are designed to use special *coaxial hoses*. These hoses are basically a tube within a tube. The inner tube, in the center of the hose, draws vapors back into the underground storage tank, while the outer tube dispenses gasoline out of the system.

Vacuum Pump in Dispenser

Refueling activates a pump inside the gasoline dispenser. This pump starts a vacuum effect, which in turn draws the vapors up into the hose and stores them in the underground storage tank. Without this vacuum, harmful vapors would escape into the atmosphere.



CARB Executive Order G-70-154-AA

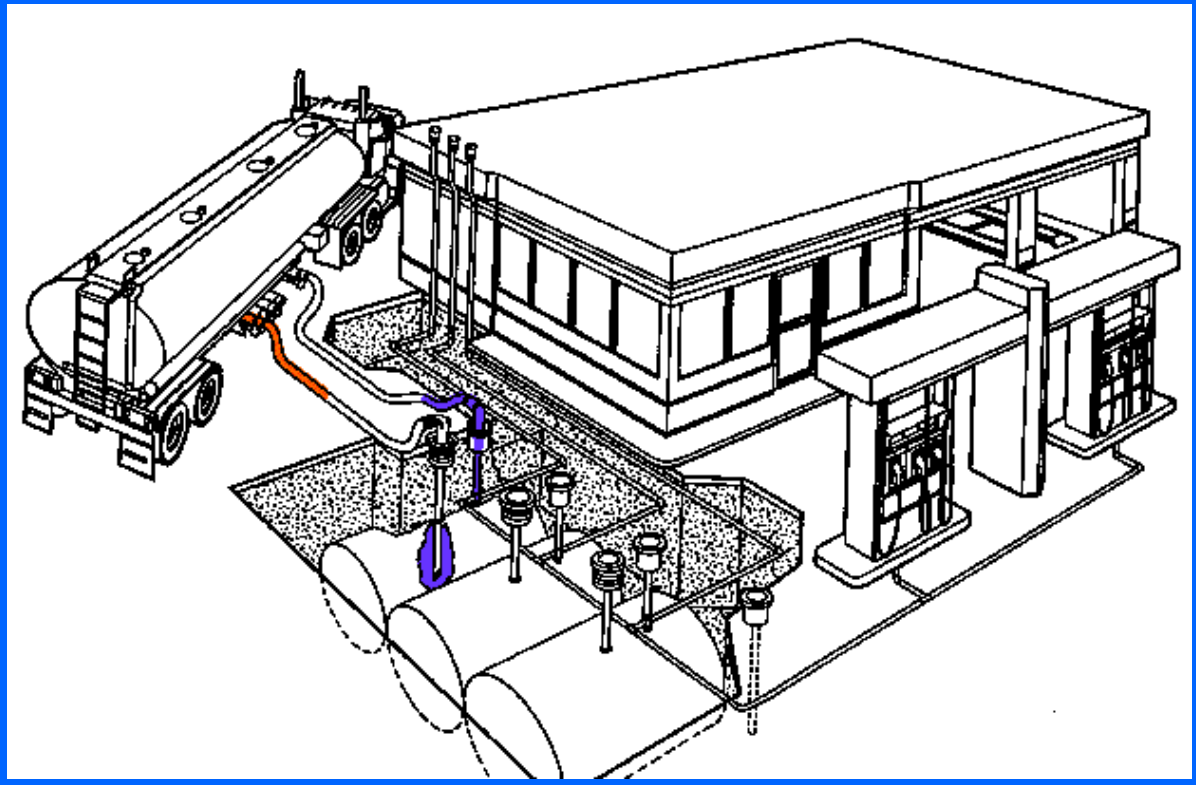
Vacuum Pump

The gasoline vapors remain in underground storage tanks until the gasoline delivery truck arrives to deliver another shipment of fuel.

While the truck dispenses gasoline into the underground storage tanks, the vapors are pushed out of the tank and placed into the truck to be processed.

Orange - Gasoline

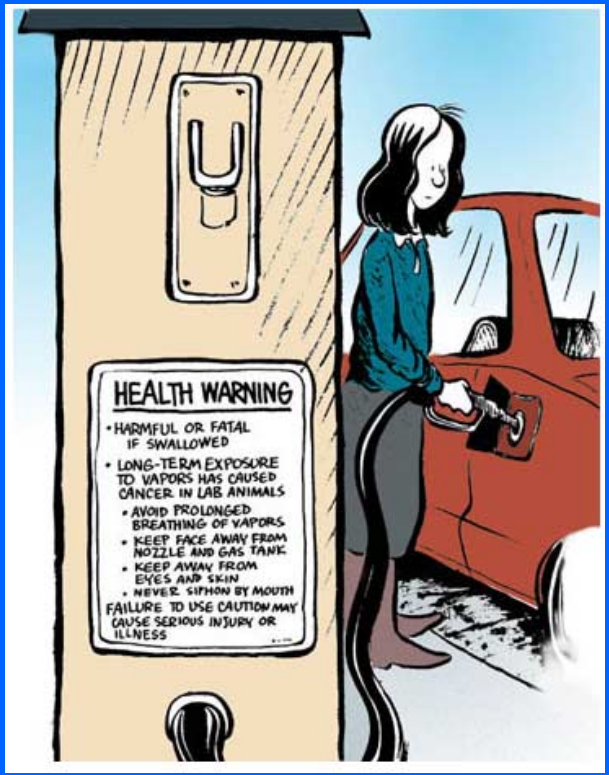
Purple - Vapor



OPW Product Animations

How Do We Know If the Stage II System Works?

To be sure the vapor recovery system installed at each gasoline station is working properly, the Wisconsin Department of Natural Resources requires each system to complete compliance testing.



www.anr.state.vt.us/dec/air/ mobile/driver/Unit4.htm

The first compliance test is called a **Pressure Decay Test**, which is completed every year. The results of this test show whether the vapor recovery system can hold pressure.

If the system fails this test, it shows that there are weak areas in the system that are leaking. The leaking sites are then found and repaired as soon as possible to form a tight seal.

The second compliance test is called a **Liquid Blockage Test**, which is completed every five years. This test verifies that the tube through which vapor travels back to the underground storage tank is free of all blockages. It is important to be sure that vapor can travel freely back to the underground storage tank. If blockages are found, they are removed, and the system is re-tested to insure compliance.

www.co.kern.ca.us/weights/ inspections.html

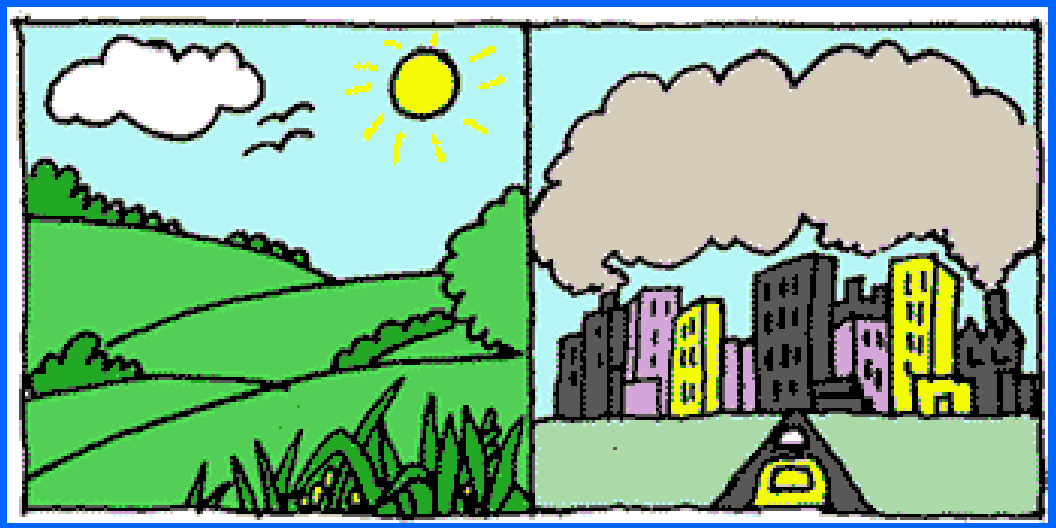
What You Can Do

Motorists can be a wonderful resource for the Department of Natural Resources. When you visit your local gas station, keep your eyes open for violations. If you see any violations contact the Department's toll-free phone number, 1-800-453-0645. Make sure you leave:

- Your name,
- A phone number where you can be reached at for further questions,
- The address of the station in violation, and
- The best description you can give of the violation you observed.

DNR Hotline 1-800-453-0645

Violations can come in all *shapes* and **sizes**. The following slides give some examples of violations you can look for to help keep our air clean.



www.oneworld.net/penguin/pollution/pollution_home.html

Sticker Posting

The first thing to look for is the Department's toll-free number. Posted on each side of every dispenser should be a sticker stating the following:

A Stage II Vapor Recovery system has been installed at this station. If there are any questions or concerns regarding this system, please contact the Department of Natural Resources at 1-800-453-0645.

What you can do
1-800-453-0645

No Sticker Posted

If you **DO NOT** see this sticker or one like it posted on each dispenser, you can call to report it. The posting is there for the protection of the public. The public has a right to report any problems with the vapor recovery system at any particular gas station.

www.utap.org/contactu.htm

What you can do
1-800-453-0645

Leaky Hoses

If you notice that a hose has a cut in it to the point where it is leaking gasoline, let the station attendant know and call the Department's hotline. This is considered a violation and should be fixed as soon as possible.

www.gaspumps.com/

Automatic Shut-Off

If the automatic shut-off mechanism on a nozzle is not working properly, this is a violation. The automatic shut-off is designed to cease dispensing before a spill occurs. When spills do occur, there is no possibility of recovering vapors from the spilled gas, which is a violation of federal regulations.

www.littleandro.com/ greenfillup.htm

What you can do
1-800-453-0645

Damaged Booted Nozzles

www.apretail.com/ products.html

If a booted nozzle is installed at a station, the boot needs to be free of any tears. If you find a boot two-thirds or more torn, contact the store manager and call the Department's toll-free hotline to report it. Make sure your phone message includes the pump number. If the tear is greater than two-thirds of the entire boot, the boot is out of compliance because it is unable to keep vapors in a confined area.

Checklist

Here is a checklist of things to look for at your local gasoline station:

Sticker - DNR 1-800-453-0645 hotline number is posted on each dispenser.

Hoses - The hoses are NOT leaking anywhere and are free of tears.

Automatic Shut-Off - Working properly.

Booted Nozzles - The boot is NO MORE than 2/3 torn.

Remember, if you are not able to check off any of the above items, please call the Department's toll-free hotline (1-800-453-0645) and report the problem.

Thank You

This presentation is designed to inform the public on issues related to Stage II Vapor Recovery in Wisconsin. When you visit your local gas station, look for possible violations and call the Department's 1-800 Hotline (1-800-453-0645) if you find any.

For further questions please contact the Department of Natural Resources at: (414) 263-8500 (ask to be connected to someone in the Stage II Vapor Recovery section)

or write us at: Stage II Vapor Recovery/DNR
2300 N. Dr. Martin Luther King Jr. Drive
P.O. Box 12436
Milwaukee, WI 53212

Remember, everything you do helps, because….

It All Adds Up to Cleaner Air

www.oneworld.net/penguin/pollution/_pollution_home.html